IMMATURE STAGES AND BIOLOGY OF *TETRAGLOSSA PALPALIS* CHAMPION (COLEOPTERA: PTILODACTYLIDAE)[1]

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ABSTRACT: The adult of the monotypic ptilodactylid *Tetraglossa palpalis* Champion, its distinctive labial palpus, and the male genitalia are illustrated. The larva, pupa, and habitat niches are described and illustrated; surface sculpture of the larva is illustrated by scanning electron micrographs. Notes on larval food and pupation are included.

Many inhabitants of lotic habitats do not fly often, if at all, and are restricted to their respective habitat niches; also, those that do fly (with some exceptions) seem not to be commonly attracted to blacklights. Although the number of specimens collected in lotic habitats is lower than the number of specimens obtained from lentic habitats in the equivalent expended time, the extra effort to obtain material from lotic habitats usually is well worth the effort. During the month of May 1981 I conducted fieldwork in the states of Chiapas, Mexico, Oaxaca, and Veracruz in Mexico. Because my companions, Dr. Joaquin Bueno and Dr. Oliver S. Flint, Jr., were trichoperists, most of my collecting efforts were directed toward obtaining dryopoid and other stream inhabiting Coleoptera. My collecting efforts in the lotic habitats were divided among examining "leaf packs"; water-logged and rotting twigs, limbs, and logs; rocks in riffles; and examination of roots and other vegetation caught under overhanging banks of streams. My efforts to collect Coleoptera occurring in streams resulted in the collection of adults and immature stages of some interesting taxa.

Among the interesting insects found was a common ptilodactylid larva which resembles larvae of members of the genera *Anchytarsus* and *Anchycteis*. However, by rearing a last-instar larva through to the adult stage I was able to establish that the larva was an immature stage of *Tetraglossa palpalis* Champion (1897) which occurs widely through much of Mexico and Central America and represents the monotypic genus *Tetraglossa*. A review of the literature revealed that Bertrand (1972) included a dorsal view of the ninth abdominal segment of a larva of *T. palpalis* and included the genus in a key to larvae of the genera of Ptilodactylidae. Because the immature stages of *T. palpalis* have not been fully described previously and the pupa was unknown, descriptions of the larva and pupa follow.

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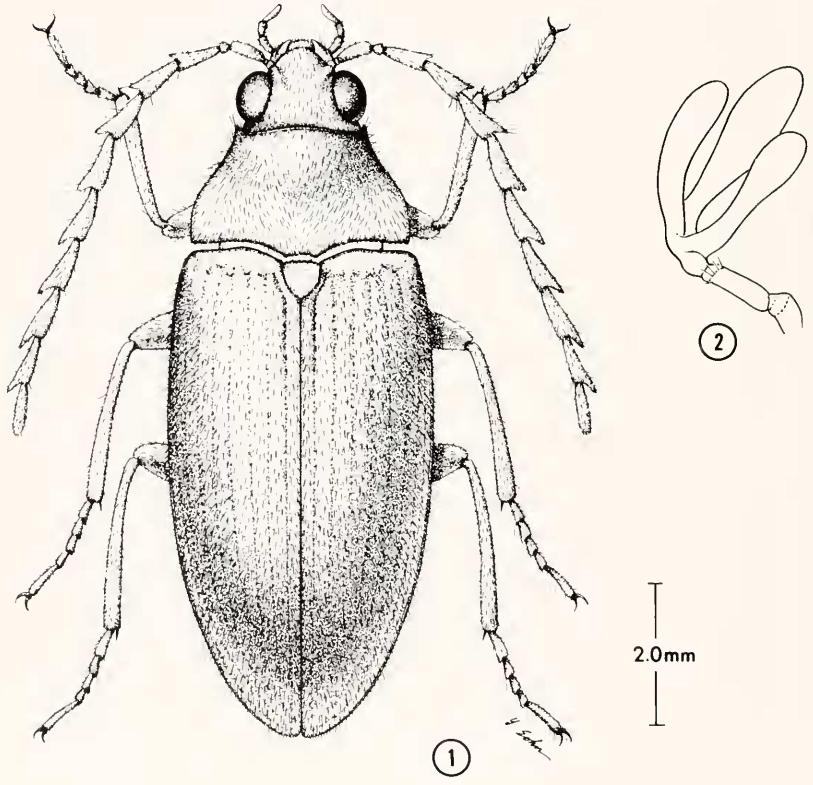
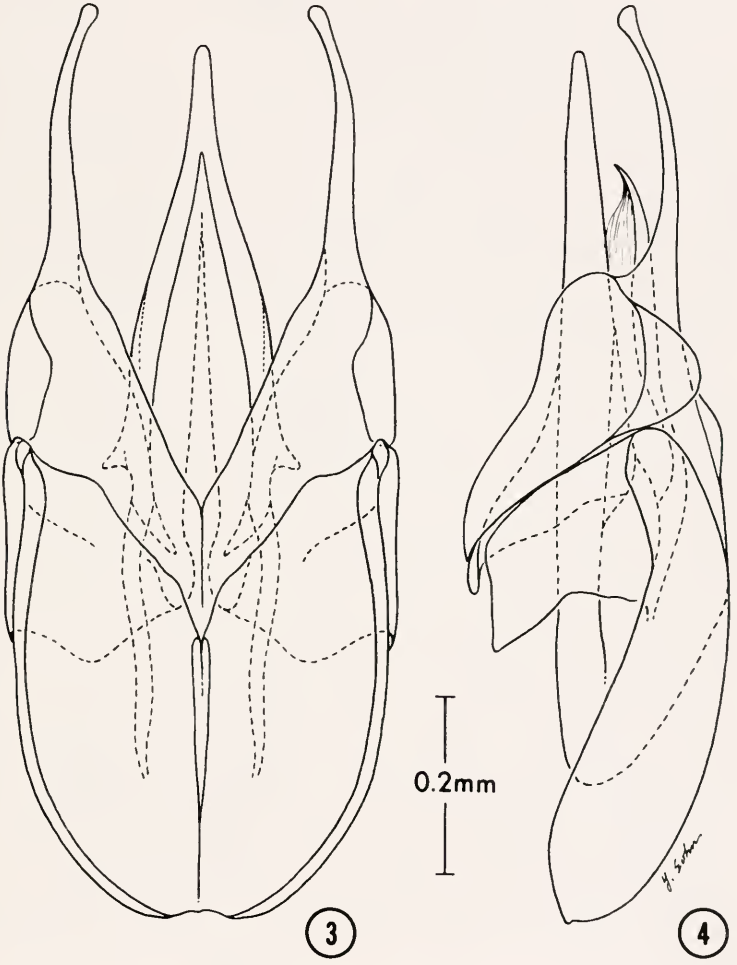
Tetraglossa palpalis

The adult of this species was adequately described by Champion (1897); illustrations of the adult, labium, labial palpus, maxilla, and maxillary palpus were included in that publication. Because Champion's illustrations are very small and somewhat schematic, illustrations in greater detail of the adult male, including habitus (Fig. 1), labial palpus (Fig. 2), and genitalia (Figs. 3 & 4), are included in this paper.



Figs. 1-2. *Tetraglossa palpalis* Champion, male adult: 1, Habitus; 2, Labial palpus.



Figs. 3-4. *Tetraglossa palpalis* Champion, male genitalia: 3, Dorsal view; 4, Lateral view.

Larva
Figures 5-15

Description: Length 17.8 mm; width of prothorax 2.1 mm. Body (Figs. 5, 6, 7) semicylindrical, moderately flattened ventrally. Color testaceous to castaneous dorsally; lighter testaceous ventrally except legs creamy yellow.

Head: Slightly wider than long (1.4:1.6mm) (Fig. 8). Ecdysial cleavage line forked near base; frontal arms diverge and extend in sinuous lines to bases of antennae. Frons sagittate. Cuticle appearing smooth except for numerous, moderately coarse punctures and 1 long seta behind each frontal arm at about basal third; 6 long setae adjacent to stemmata; 3 long setae on each anterolateral angle of clypeus near bases of antennae. Labrum with 6 long setae across anterior surface and small tufts of setae on anterolateral angles. Stemmata single; large, strongly convex; on each side of head directly behind bases of antennae; with distinct black pigment beneath lens. Antenna long, cylindrical; of 3 antennal segments; first segment longest; second segment about four-fifths as long as first; third segment minute. Clypeus broad, feebly arcuate. Labrum narrower than clypeus; finely, densely punctate; and feebly emarginate anteriorly. Mandible tridentate apically; mesal surface sulcate; anterior and posterior margins each with a tuft of long golden setae at about midlength. Maxilla and labium as illustrated (Fig. 9). Submentum divided longitudinally into 3 sclerites.

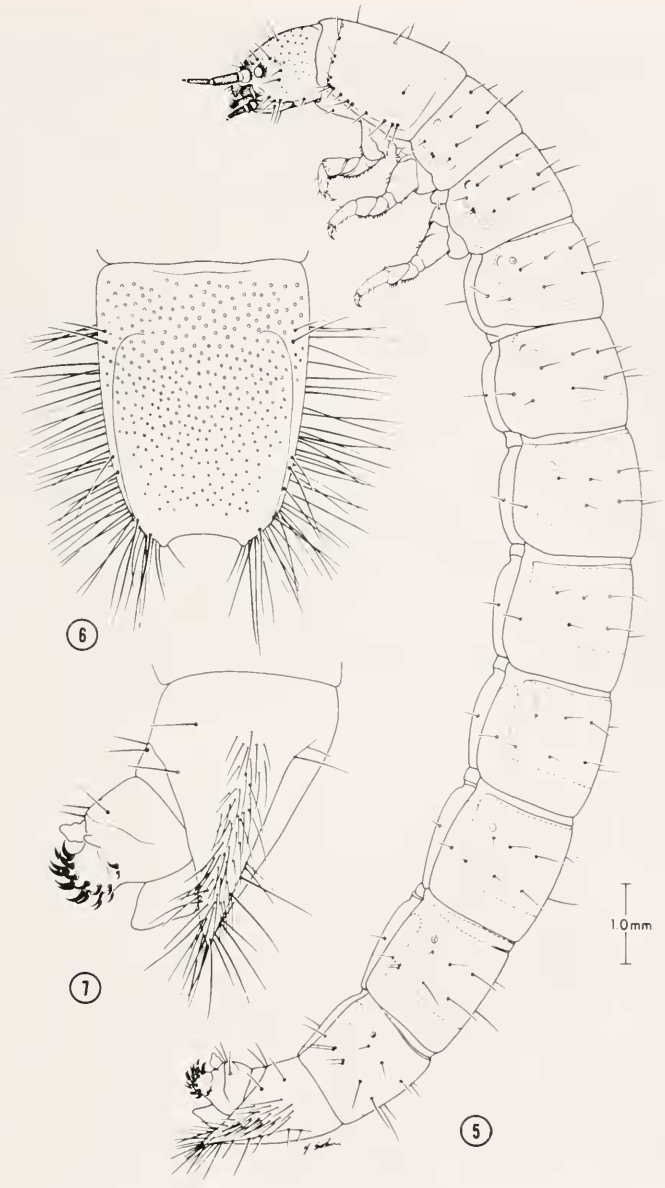
Thorax: Prothorax almost twice as long as mesothorax; bearing 3 long setae in a longitudinal row between midline and lateral margins and several more long setae along lateral margins. Mesothorax with 1 large spiracle anterolaterally; with 2 long setae in a longitudinal row between midline and lateral margins plus several more (6 or 7) on each lateral margin and a second longitudinal row of 3 long setae laterally in line with spiracle; 2 setae on mesal side of spiracle and 1 seta at about posterior third; cuticular punctures coarser and denser across apical margin. Metathorax similar to mesothorax but without spiracles. Hind margins of thoracic and abdominal segments strigate. Legs four-segmented, short and stout; second and third segments ventrally with row of dense, robust, spines along anterior and posterior (inner and outer) margins (Fig. 10). Last segment (tibiotarsus) terminates in a single robust claw.

Abdomen: Of 9 segments; segments 1-8 similar to metathorax in punctation but long setae are in 2 rows between biforous spiracle (Fig. 11) and midline; 2 long setae posterior to spiracle and 2 long setae arising together from posterolateral angle of each segment. Tergum of last abdominal segment compressed dorsoventrally (Fig. 6); discal area moderately convex; lateral margins strongly keeled; side beneath keel on each side with longitudinal rows of long hairlike setae; posterolateral angles obtuse, subspinose; apex broadly and moderately deeply emarginate. Ventral surface of last abdominal segment bearing a pair of large, robust, prehensile appendages each of which bears a pair of large, stout, curved, lateral hooks and 8-22 similar hooks on posteroventral surface (Fig. 7). Gills, 6; 1 large conical dorsal gill above and between appendages; a single small lateroventral gill below lateral pair of hooks; and a pair of moderately large ventral gills between appendages. Two pairs of long setae between and slightly posterior to ventral gills and a single long seta posterior to lateroventral gill.

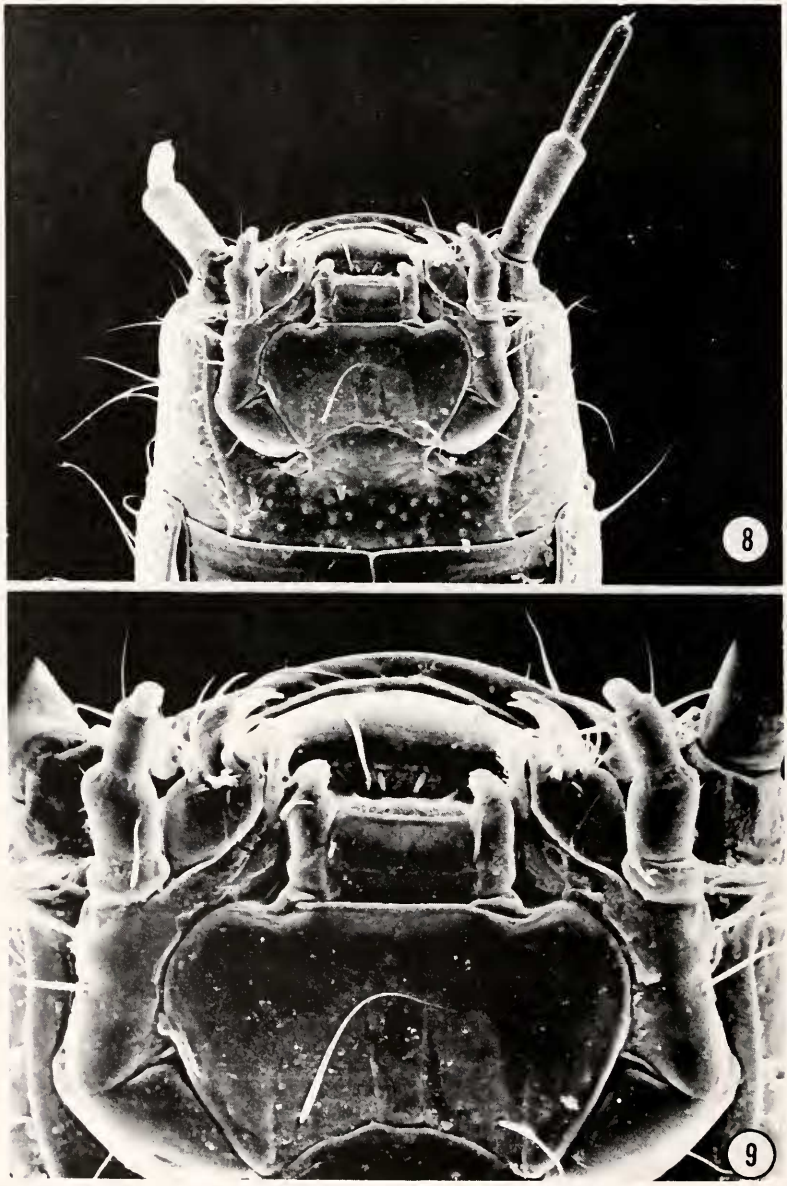
Surface sculpture of larva: Examination of the larval head capsule (Fig. 12) with the SEM revealed that most of, if not all, the punctures bear a cluster of minute slender setae arising from a common base (Figs. 13, 14). It is unknown whether those setae perform a sensory function; however, the apex of the last antennal segment is surrounded by sensilla (Fig. 15).

Variations: The number of curved hooks on the prehensile appendages on the last abdominal segment vary considerably. The hooks on the smaller, earlier instars varied from 8 to 13 hooks on each appendage; the hooks on the large, last-instar larvae varied from 15 to 22 on each appendage.

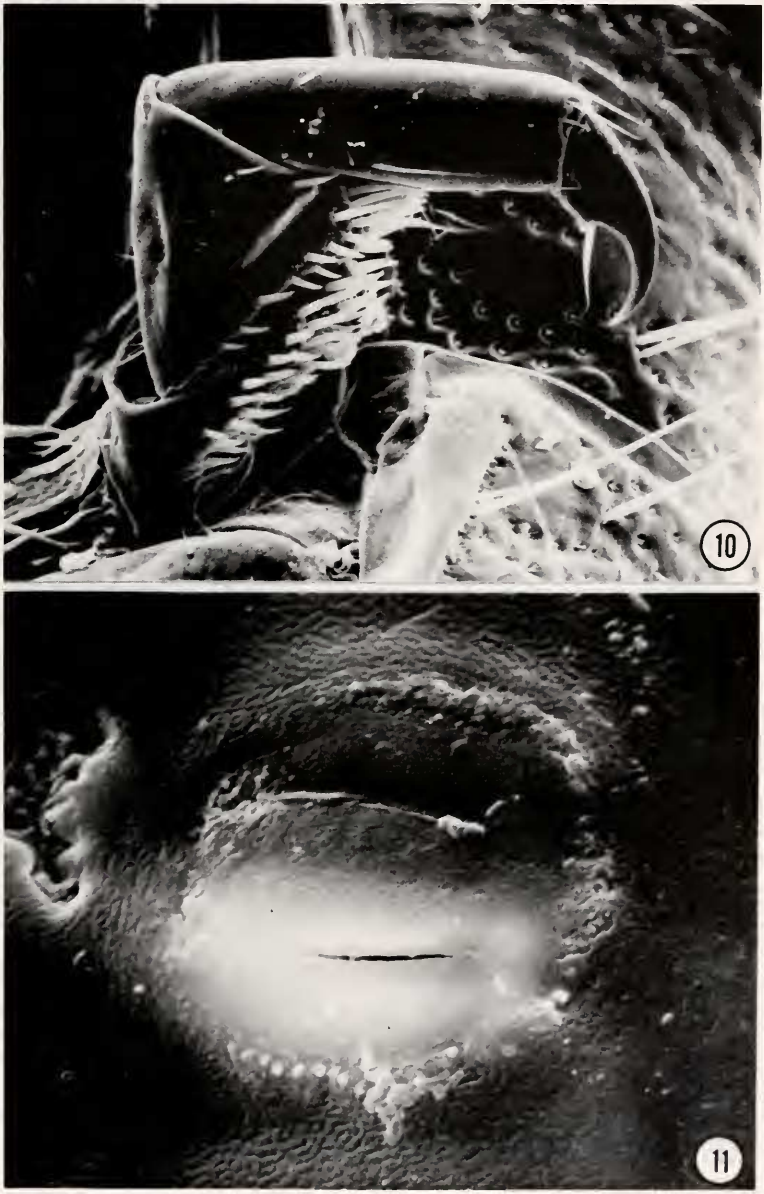
Food: Examination of the gut contents showed that the larvae were feeding on the plant material on which they were found.



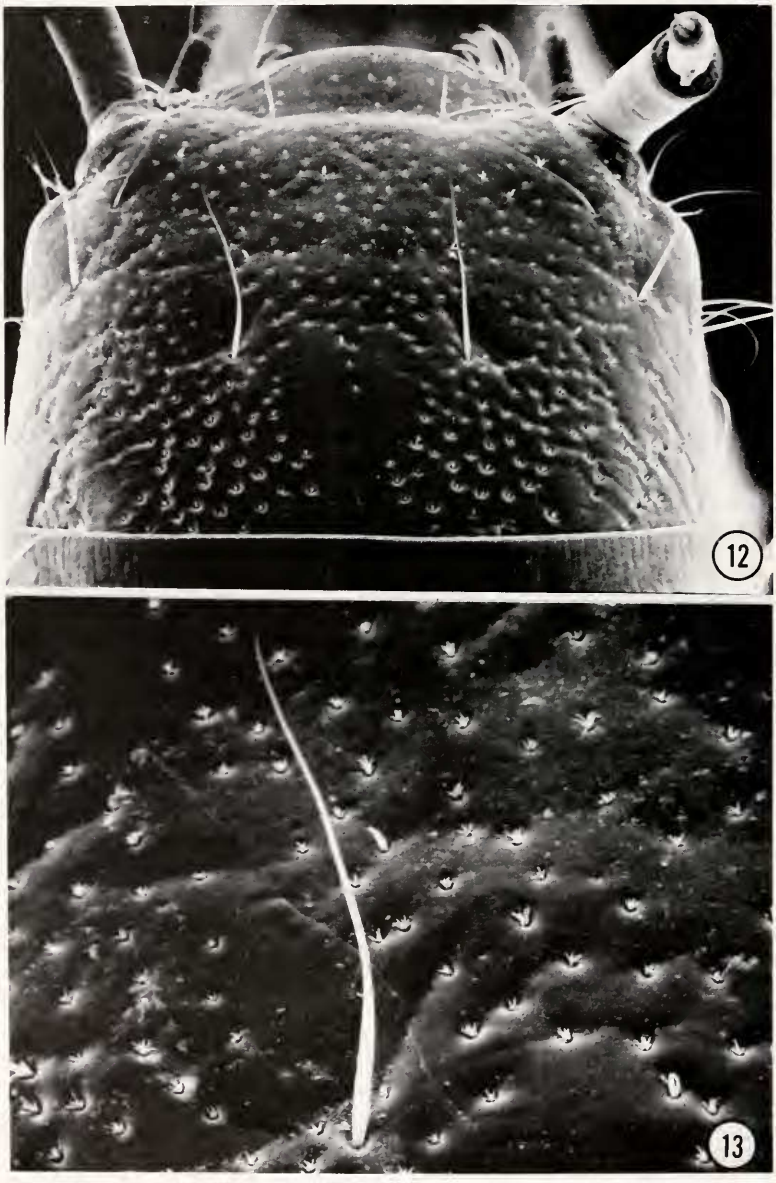
Figs. 5-7. *Tetraglossa palpalis* Champion, larva: 5, Habitus, lateral view; 6, Last abdominal segment, dorsal view; 7, Last abdominal segment, lateral view.



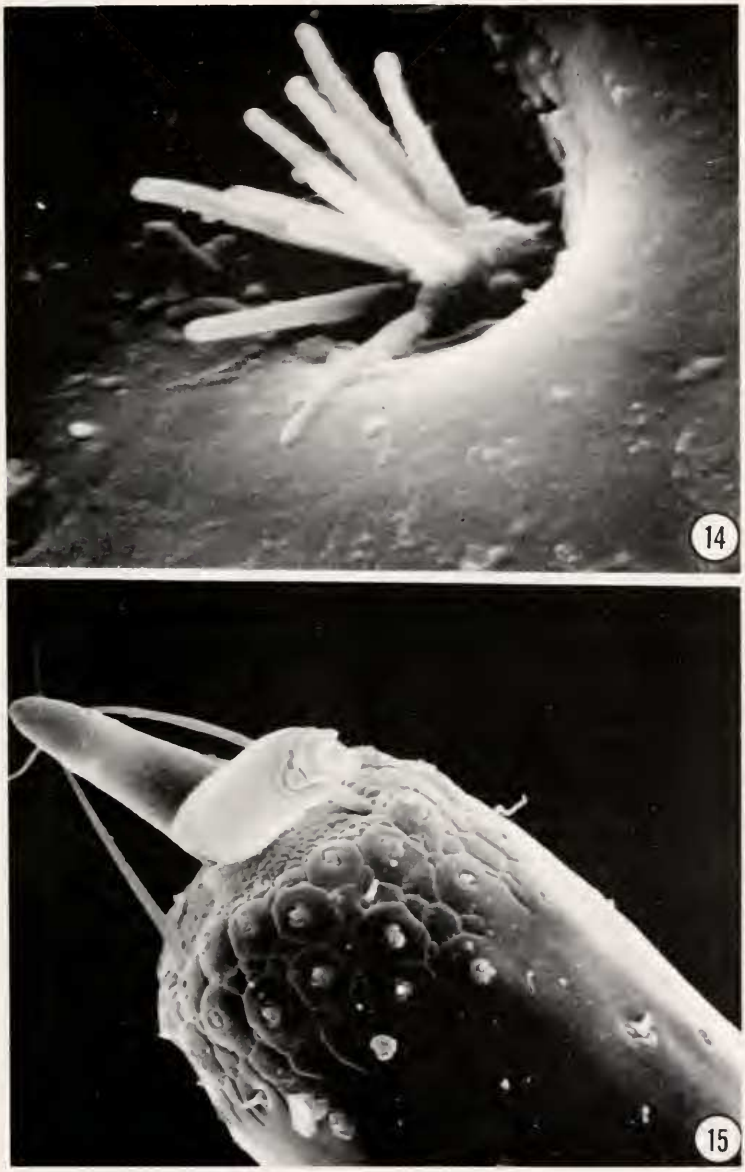
Figs. 8-9. *Tetraglossa palpalis* Champion, larva: 8, Head, ventral view, 125X; 9, Labium and maxillae, 170X.



Figs. 10-11. *Tetraglossa palpalis* Champion, larva: 10, Front leg, 225X; 11, Spiracle, 2650X.



Figs. 12-13. *Tetraglossa palpalis* Champion, larva: 12, Head, dorsal view, 125X; 13, Sculpture on head, 360X.



Figs. 14-15. *Tetraglossa palpalis* Champion, larva: 14, Setae in punctures on head, 1000X; 15, Sensilla on antennal apex, 3000X.

Pupa
Figures 16-19

Description: Length (including cerci) 12.0 mm. Color white with pronotal styli, cuticular setae, spiracles, gin-traps, sclerite on first abdominal tergum, and cerci testaceous. Short cuticular setae on areas as described.

Head: With moderately dense cuticular setae on dorsum, denser at inner apical corner of each eye. Antennae directed posteriorly, lying along side of pronotum (Fig. 16). Maxillary and labial palpi extended posteroventrally. Ultimate labial palpal segment trifurcate in male, unbranched in female.

Thorax: Pronotum with moderately dense cuticular setae and 4 robust styli; 1 strongly angular stylus on each anterolateral angle and 1 arcuate stylus on each posterolateral angle. Mesonotum and metanotum and their respective wing pads with sparse cuticular setae only. Front, middle, and hind femora extend outward at right angles from body-axis and lie beneath elytral wing pads. All legs with tibiae folded against femora; all tarsi turned backward parallel with body axis.

Abdomen: Tergum of abdominal segment 1 with small subrectangular sclerite at apicomedial margin; terga of remaining abdominal segments with sparse cuticular setae. First through seventh abdominal segments each with a pair of spiracles; 1 spiracle on each anterolateral corner of each segment; those spiracles on segment 1 small, poorly developed. Gin-traps, 4; present between first through fifth abdominal segments (Figs. 17, 18). Cerci elongate, blunt apically (Fig. 19).

Pupation: On May 15, 1981, while collecting about 25 km northeast of Catemaco, Veracruz, Mexico, I found a sapling which had fallen into the Rio Palma; many leaves and twigs had drifted against the sapling and formed a dense leaf pack. The leaf pack was about one-third of a meter thick, two meters long and one-half meter wide (Fig. 20). By carefully pulling this leaf pack apart I uncovered 60 larvae, 1 pupa, and 3 adults of *T. palpalis*. Numerous large, apparently last-instar larvae were found in poorly defined pupal cells. The pupal cells were simply oval depressions about 25 X 18 mm, were usually in moist leaves 3 to 4 cm above the waterline, and appeared to have been formed by the respective larvae chewing the leaves and compacting them by wriggling movements. Some earlier instar larvae were found randomly throughout the leaf pack; several larvae in cavities under loose bark of rotting branches in the leaf pack, and numerous larvae inside hollow twigs in the leaf pack. One pupa eclosed a half hour after it was collected. Three last-instar larvae found in pupal cells were kept alive for rearing to obtain pupae for preservation and illustration, to establish the length of the pupal stage, and to verify the presumed identity. The three larvae pupated and one of the pupae eclosed 4 days after pupation; that adult and the two remaining pupae were then preserved.

Habitat: Larvae, pupae, and freshly eclosed adults were present in almost all lotic habitats examined—large rivers, small streams, small cascades, and seeps. In all of the habitats where specimens of *Tetraglossa palpalis* were found, two factors were always present—clean running water and accumulations of vegetation in various stages of decomposition.

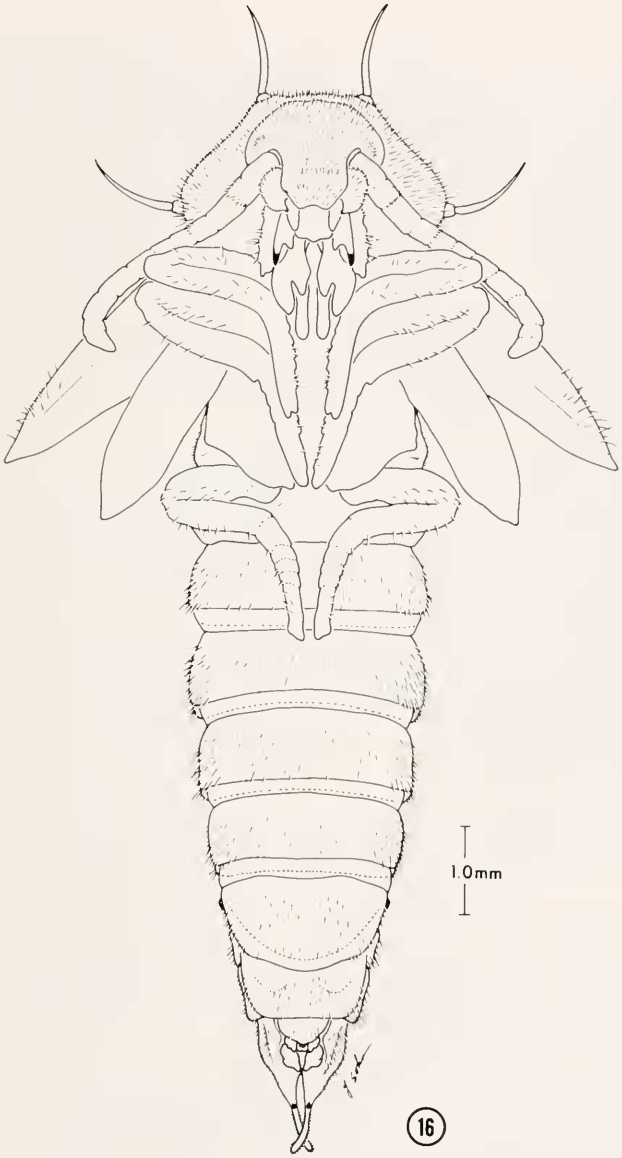
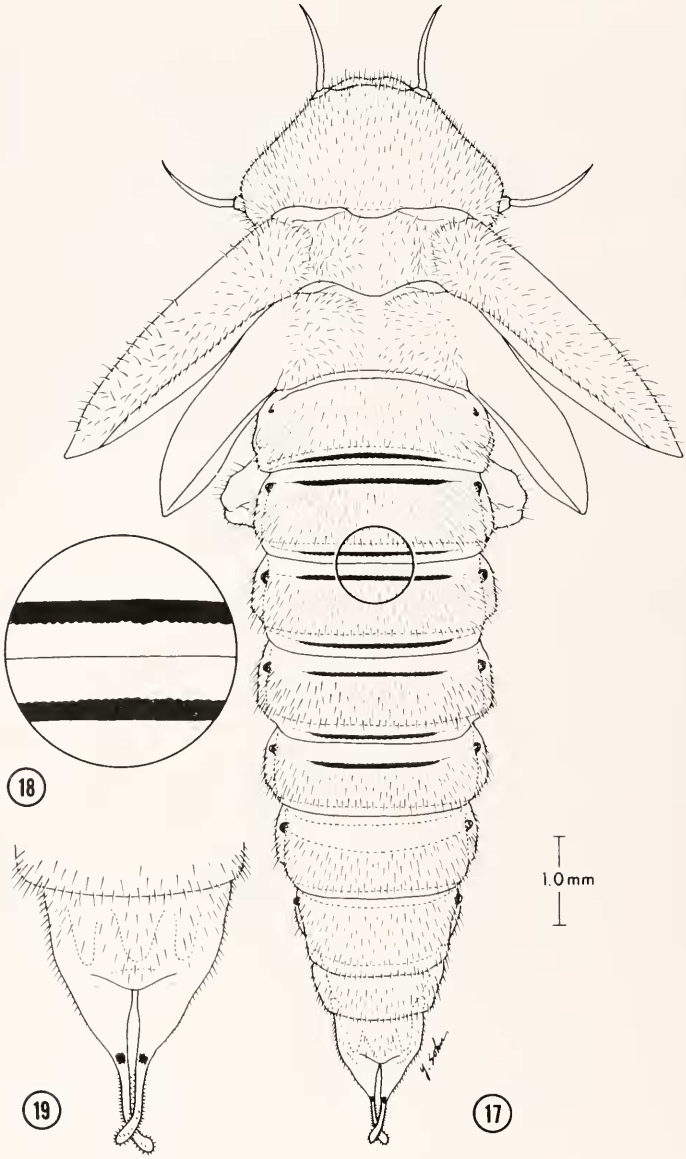


Fig. 16 *Tetraglossa palpalis* Champion, pupa, ventral view.



Figs. 17-19. *Tetraglossa palpalis* Champion, pupa: 17, Dorsal view; 18, Gin-traps, enlarged; 19, Cerci.

Figs. 20-21. *Tetraglossa palpalis* Champion, habitats: 20, Leaf pack, Rio Palma; 21, Leaf pack, Rio Tulija.

Figs. 22-23. *Tetraglossa palpalis* Champion, habitats: 22, Mat of roots from seep; 23, Picking specimens from roots.

Specimens were especially abundant in leaf packs (Figs. 20, 21) and among rootlets. On seeps, specimens were found by pulling the mats of roots loose from the substrate, placing the roots on a cloth and then carefully sorting through the plant material (Figs. 22, 23).

In leaf packs lodged against the partly submerged tree in the Rio Tulija, taxa associated with specimens of *T. palpalis* were: Limnichidae (*Eulimnichus* sp.), Lutrochidae (*Lutrochus* sp.), and Elmidae (*Austrolimnius* sp., *Heterelmis* sp., *Microcylloepus* sp., and *Phanocerus* sp.). Other beetles associated with *T. palpalis* in the matted roots (Figs. 22, 23) on the seeps were: Dryopidae (*Elmoparnus* sp.), Elmidae (*Elsianus* sp. and *Heterelmis* sp.), Hydraenidae (*Spanglerina* sp.), and Hydrophilidae (*Oocyclus* sp.).

Specimens examined (all in National Museum of Natural History, Smithsonian Institution). — BELIZE: TOLEDO DISTRICT: Blue Creek Village, 30 June 1981, W. Steiner, 25 larvae; San Antonio (5 km N), Columbia Forest, 26 June 1981, W. Steiner, 1 larva. GUATEMALA: ALTA VERAPAZ: Trece Aguas, April 1906, 1 larva; Trece Aguas, 25, 27, 30 Mar., Schwarz & Barber, 6 adults; Trece Aguas, 7, 16, 22 Apr., Schwarz & Barber, 5 adults. — MEXICO: CHIAPAS: Ocosingo (22 km N), Rio Lacanja, 19 May 1981, P.J. Spangler, 1 larva; Ocosingo, Rio Contento, 20 May 1981, P.J. Spangler, 1 larva; Pacific Coast Cordilleras, L. Hotzon, 800-1000m, 1 adult. OAXACA: Valle Nacional (8 km S), 25 May 1981, P.J. Spangler, 14 larvae; Valle Nacional (8 km S), 25 May 1981, C.M. and O.S. Flint, Jr., 1 larva. SAN LUIS POTOSI: 2 km W. Tlamaya, 8 km N. Xilitla, Sotano de Huitzmolotitla, 29 Jan. 1964, T. Raines and T. Phillips, 1 adult. VERACRUZ: La Palma (above town), Los Tuxtlas area, Rio Palma, 7 May 1981, P.J. Spangler and S. Santiago, 1 larva; La Palma (above town), 15 May 1981, P.J. Spangler, 1 adult, 60 larvae, 1 pupa; Los Tuxtlas area, Rio Maquinas, 13 May 1981, P.J. Spangler, 4 larvae; Palenque (48 km S), Rio Tulija, 17 May 1981, P.J. Spangler, 1 larva; Palenque Ruinas, 10 July 1981, W. Steiner, 1 larva. — PANAMA: CHIRIQUI: Rio Chrirqui Viejo (Volcan), Foster, 1 larva. PANAMA: La Chorrera, 10 May 1912, Aug. Busck, 1 adult.

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